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Microlepidoptera Notes and New Species

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EUCOSMIDAE
OLETHREUTINAE
GENUS *EXARTEMA* CLEMENS

Exartema zellerianum Fernald

Exartema nitidanum, Zeller (*nec* Clemens), 1875, Verhandl. Zool. Bot. Gesell. Wien, vol. 25, p. 270, pl. 8, fig. 15.

Exartema zelleriana, Fernald, 1882, Trans. Amer. Ent. Soc., vol. 10, p. 29 (*partim, nec* biology).

Exartema trepidulum Heinrich, 1926, Bull. U. S. Natl. Mus., no. 132, p. 147, pl. 16, fig. 81. McDunnough, 1942, Canadian Ent., vol. 74, p. 64 (biology). New synonymy.

As noted by Heinrich (*ibid.*, p. 139) there has always been considerable doubt as to the identity of the species for which the name *zellerianum* was proposed by Fernald. This name was based on the male specimen misidentified by Zeller as *nitidanum* Clemens, and now incorporated in the British Museum. A further error was made by Fernald in proposing the name *zelleriana,* owing to a statement that the larval food plant was birch (*Betula alba* var. *populifolia*). This error was perpetuated by both Forbes and Heinrich, although the latter author (*ibid.*, p. 140) notes that Kearfott "noticed this discrepancy . . . and suddenly applied the name *zellerianum* to quite a different looking insect." Through the cooperation of Mr. J. D. Bradley of the British Museum (Natural History) a photograph of the Zeller specimen and also one of its genitalia have

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been received, and there seems to be no reasonable doubt but that Kearfott was correct and that the name *trepidulum* Heinrich, proposed rather doubtfully for Kearfott's series under the name *zellerianum,* must be relegated to the synonymy. A very characteristic feature of both Zeller's original figure and the recent photograph is the presence of a fine, longitudinal, ochreous line which divides the median band just costad of the lower tooth, a feature stressed by Heinrich in his key to the species (*ibid.,* pp. 132–133) and in his detailed description of *trepidulum.*

The correct food plant of the species is *Viburnum cassinoides,* as stated by the present author in his 1942 paper.

For the species generally known as *zellerianum* Kearfott's manuscript name of *betulanum,* validated by Heinrich (*ibid.,* p. 140), is applicable, and the synonymy of the birch feeder is as follows:

Exartema zelleriana, FERNALD (*nec* Fernald), 1882, Trans. Amer. Ent. Soc., vol. 10, p. 29 (*partim,* biology). HEINRICH, 1926, Bull. U. S. Natl. Mus., no. 132, p. 139, pl. 14, fig. 63, pl. 34, fig. 203. MCDUNNOUGH, 1942, Canadian Ent., vol. 74, p. 64.

Cymolomia zelleriana, FORBES, 1924, Cornell Univ. Agr. Exp. Sta. Mem., no. 65, p. 465.

Exartema betulana (Kearfott MS) HEINRICH, 1926, Bull. U. S. Natl. Mus., no. 132, p. 140.

The holotype is a female in the American Museum so labeled by Kearfott. It has been examined by the author.

In Heinrich's Group II of this genus (1926, Bull. U. S. Natl. Mus., no. 132, p. 145) comprising species in which the male genitalia show "a spined digitus projecting from neck of harpe away from sacculus (close to cucullus)," there is a group of species closely associated with *permundanum* Clemens which, as far as the genitalia of both sexes are concerned, cannot be separated with any degree of certainty on such characters. In the male genitalia examination of a number of genitalic slides has shown that the arrangement of the spines at the base of the cucullus, in what Heinrich terms "*Spc*[1]," varies to a certain extent, and such differences as indicated for example in his figures of *valdanum* and *permundanum* (pl. 17, figs. 89, 90) cannot be relied upon as specific characters, especially in view of the fact that it is almost impossible to secure exact similarity of position in mounting the preparation in balsam. In the female genitalia a similar degree of variability occurs, notably in the structure of the two median tubercles directly caudad of the ostium and, to an even greater extent, in the size of the lateral, thumb-like processes on the genital plate (*vide* Heinrich's pl. 36, fig. 225).

If the genitalia be left out of consideration, it has appeared that a

greater degree of reliability in separating species can be placed on color and maculation of the primaries, but that in the final instance a series of specimens bred from larvae found on an individual food plant are essential as a check on any variation of such characters as might occur.

In Nova Scotia three named species belonging to the above group have so far been found, and a good series of specimens secured from larvae collected on individual species of plants. These species are *permundanum* Clemens, *valdanum* McDunnough, and *baccatanum* McDunnough, and in each case it was noted that the specimens comprising a bred series showed surprisingly little variation one from the other. It would also appear that the larvae are restricted to a single food plant or, at the most, to very closely related species of plants. The following notes on these species are offered.

Exartema permundanum Clemens

The identity of *permundanum* has always been a matter of some doubt, and the fact that Clemens cites *Spiraea* as the host of his type and later (1865, Proc. Ent. Soc. Philadelphia, vol. 5, p. 134) in his key to *Exartema* species states that the forewings are "with costa at base ochreous white" tends to obscure the matter still further and lead to the belief that Clemens' type series was mixed. The so called "type" in the Academy of Natural Sciences of Philadelphia was examined carefully by T. N. Freeman in 1942, and a specimen from the Canadian National Collection was marked as agreeing closely. This specimen has been lent for examination and matches quite satisfactorily specimens of a series bred at Halifax from larvae feeding on blackberry (*Rubus hispidus*). Heinrich also cites blackberry as a food plant (1926, Bull. U. S. Natl. Mus., no. 132, p. 156) with the addition of strawberry and raspberry among other things. Such alternate food plants are quite probable, although larvae have never been found on them in Nova Scotia, but the listing of *Spiraea salicifolia, Corylus,* and *Hickoria* as food plants is, in the present author's opinion, due to a misidentification of species, and he suggests therefore that the name *permundanum* should be restricted to the blackberry feeder. As regards the synonyms listed by Heinrich (*ibid.*, p. 155) little that is definite can be said of *meanderana* Walker, described from a male from the Carter Collection with no other locality given than "North America." The description is useless for identification, but a photograph of the type (now, alas! with missing abdomen) is in the Canadian National Collection, and this could doubtfully be said to agree fairly well with specimens of the blackberry feeder. Under the circumstances it seems best for the present to follow Walsingham (1879, Lepi-

doptera, Heterocera in the British Museum, pt. 4, p. 23) in placing *meanderana* as a synonym. Heinrich also has validated Kearfott's manuscript name of *gaylussaciana,* stating "I can find nothing to separate it from typical *permundanum* either in pattern or structure." Through the kindness of Dr. A. B. Klots it has been possible to examine Kearfott's type and other specimens of the series, and this synonymy appears doubtful. The fringes of the primaries are entirely black, not checkered, and the general maculation is rather more obscure than that of the blackberry feeder, with the paler antemedian and subterminal areas broader. The dark basal patch is not continued to costa which shows a paler color in this area than the remainder of the patch, agreeing in this respect with the *permundanum* of Clemens' key but not with his existing "type." In any case the specimens are quite distinct from *baccatunum* McDunnough, a feeder on *Gaylussacia baccata.* It would be interesting to learn whether any specimens have been bred in recent years in the eastern New Jersey area from larvae on *Gaylussacia* and also to discover which species of this plant genus was involved.

As restricted to the blackberry feeder *permundunum* is a fairly large species with an average wing expanse of 15 mm. The color of the primaries is a rather dark olivaceous owing to a heavy covering of fine, greenish scales over the deep brown areas, notably in the median band. This band has a very irregular outer margin, with strong identations of the paler postmedian band in the cell and above the fold. In the cell area the two so-called "teeth" are longer than usual; the upper one is thin and pointed, the lower one more or less hammer-shaped with broad base; frequently the cubital vein is faintly marked with yellowish as it crosses the band. The tornal spot is large, bluntly triangular, and separated from both the median band and the subapical bar by narrow, paler areas. The subapical bar is club-shaped, broadening considerably towards its apex and at times connected by a fine dark line with the first of the three dark costal spots. The paler antemedian and very irregular postmedian bands show a slight but distinct silvery tinge and are quite improminent owing to a variable marbling of fine, darker streaks. The basal patch shows an indentation in the fold and is usually continuous to the costal edge, although in this area there is a rather greater suffusion of the olivaceous scaling which lightens the coloration to a slight extent. The fringes are blackish at the apex and in an area opposite the base of the subapical bar, otherwise largely pale creamy, with a slight checkering of smoky, most obvious at tornus. The secondaries are deep smoky, paling slightly basally, with pale fringes cut by a fine, dark, subbasal line. In general the females appear to be slightly more deeply colored than the males.

The larvae are of the usual *Exartema* type, bright green with black head and prothoracic shield and very lively. They may be found in early spring, tying the young leaves of blackberry into a large, loosely bound tent. At Halifax bred specimens emerged during the last week in June, but at White Point Beach in 1954 the species was collected nearly a month later flying around the food plant. In 1955 a single quite small larva was found on blackberry in late June which produced a female adult on July 17.

In conclusion it should be mentioned that in 1953 at White Point Beach small series of an *Exartema* very similar to *permundanum* were flushed out of a growth of *Vaccinium* on July 10, 14, and 20. The general appearance of these specimens was paler than that of *permundanum,* owing largely to the fact that the pale bands lacked a good deal of the dark marbling and, in consequence, were more prominent. In 1954 and 1955 no further specimens were seen, nor could larvae be discovered in spite of careful search. It is probable that another sibling species is represented, but until the food plant is definitely established it seems best to leave the matter in abeyance.

Exartema valdanum McDunnough

This species is readily distinguished from others of the group by the white antemedian and postmedian bands. The dark areas show much less olivaceous sprinkling, the basal patch being almost solidly deep brown, its outer margin irregular, with a slight indentation in the fold. The median band is broad, with the greenish suffusion largely confined to a patch on the inner area above the inner margin of the wing. In general, especially in the females, it includes the tornal spot which is either entirely obliterated or separated by a fine pale projection of the postmedian band. The two "teeth" in the cell area are much reduced in size as compared with those of *permundanum* and are hardly worthy of the name, as they scarcely project beyond the outer margin of the band and are merely indicated by a narrow indentation of the pale postmedian area into the band proper.

The Kearfott manuscript name, *micantanum,* was validated by Forbes (1924, Cornell Univ. Agr. Exp. Sta. Mem., no. 68, p. 464) who erroneously gave *Cornus* as the larval food plant. According to Klots (1942, Bull. Amer. Mus. Nat. Hist. vol. 79, p. 405) the type was bred from a larva on "hardhack" (*Spiraea*), and this food plant was proved to be the correct one by the present author (1933, Canadian Jour. Res., vol. 9, p. 515). The synonymy as given by Heinrich (*ibid.,* p. 153) is therefore correct, although he repeats Forbes's error as regards the food plant. The

species is common along the south shore of Nova Scotia, and good series have been bred at both Halifax and White Point Beach, Queens County, from larvae on *Spiraea latifolia.* In two instances single females were bred in the latter locality from larvae found on bayberry (*Myrica pennsylvanica*) and sweet gale (*Myrica gale*), but as the plants were growing in close association with *Spiraea* this occurrence was either due to a mistake in ovipositing or to the straying of the larva from the normal food plant.

The larva can hardly be distinguished from that of *permundanum,* being bright green with black head and prothoracic shield. It lives in tied-together terminal leaves of *Spiraea* in late spring, forming a compact tent much like that of *Evora hemidesma* which occurs on the same plant. As usual it is very active and is liable to back out of the tent and drop to the ground when pressure is put on its habitation. Bred specimens emerged at Halifax in early July, but at White Point Beach the species was not on the wing until early August.

Exartema baccatanum McDunnough

The species was described (1942, Canadian Ent., vol. 74, p. 65) from a long series of specimens bred from larvae found tying the terminal shoots of *Gaylussacia baccata* at South March in the vicinity of Ottawa, Ontario.

At the time it was noted that a few specimens had been bred from larvae on the same food plant in Nova Scotia. Further investigations in this province have shown that the larvae occur fairly commonly on this plant in June, both in the Halifax area and at White Point Beach, Queens County, and the species is probably widespread throughout the province wherever *Gaylussacia* grows.

Apart from the smaller size of Nova Scotian specimens as compared with *permundanum* and *valdanum,* the average wing expanse being 12–13 mm., the species is characterized by the rusty-red suffusion on the thorax and primaries. This is somewhat less marked than in the type series but is still quite obvious. In only a single bred female from White Point Beach is the reddish color practically lacking. In maculation of the primaries the species shows greater resemblance to *permundanum* than to *valdanum.* The pale areas are improminent, of a silvery character, with a slight pinkish tinge, obscured somewhat by dark strigae or, in the case of the antemedian band, by a fine, dark, median line. The outer teeth in the cell area of the irregular median band are well developed but not quite so long as in *permundanum,* and the indentation above the fold is deep, nearly cutting the band in two. The width of the band is generally considerably reduced at the inner margin of the wing. The tornal spot is well separated from the median band and of the usual bluntly triangular

character; the subapical bar is broad and much as in *permundanum*. The dark basal area extends to the costa, the outer margin being rather irregular, without any marked indentations but bending inward below the costa. In the fringes the pale subapical and tornal areas are less obvious and show generally a slight checkering of smoky. The secondaries are deep smoky, with whitish fringes cut by a dark subbasal line. In the female sex the coloration is generally somewhat deeper than that of the male.

The larvae, while of the usual *Exartema* type, are not so strikingly green in coloration, being more of a yellowish green, resembling in this respect the color of the plant leaves. In tying the terminal leaves together they form in general a long, narrow receptacle, quite dissimilar to the compact, chunky tents of *valdanum,* and readily recognizable when one is searching for larvae. The presence of larvae on the plants varies considerably from year to year, owing probably to parasitism to which they appear to be very susceptible. The adult emerges from the middle of July onward.

Another of Kearfott's manuscript names validated by Heinrich is *myricana,* based on specimens bred from larvae on bayberry, *Myrica carolinensis,* now called *M. pennsylvanica.* The name was placed as a synonym of *sericoranum* Walsingham as noted by Klots (1942, *ibid.,* p. 406). As to the correctness of this procedure no comment can be made, as the identity of this species is somewhat doubtful. However, after an examination of two of the Kearfott type series, both of which show a yellowish color of the primaries, it has become evident that no similar specimens have been collected in Nova Scotia. The matter is of importance, as a species belonging to the present group has been bred in numbers at White Point Beach from larvae feeding on *Myrica gale* (sweet gale), and which, up to the present, has been doubtfully considered as a dark form of *permundanum.* After a careful study of this series, the present author has arrived at the conclusion that a so-called "food plant" or sibling species is represented which seems worthy of a name. The description follows.

Exartema galevora, new species

In size considerably smaller than *permundanum,* averaging 12–13 mm. in wing expanse. The general appearance of the primaries is darker than the olivaceous color of *permundanum,* owing partly to the deeper ground color of the dark bands and also to the fact that the overlay of fine scales on them tends more to brown than to greenish. As far as maculation goes, this is extremely close to that of *permundanum* but is somewhat more compact on account of the shorter length of the wing; this is quite noticeable in the narrower width of the pale antemedian band. In the

dark median band the two "teeth" in the cell area projecting from the outer margin are slightly shorter and closer together; the lower one is definitely chunkier. The pale areas show a slightly greater silvery tinge (at times faintly bluish) than is normal in *permundanum*. In the fringes the pale areas below the apex and at tornus are rather improminent owing to a slightly smoky suffusion. The secondaries are very dark smoky, with whitish fringes cut by the usual fine, dark, subbasal line.

The above description is drawn from the holotype and would seem to represent the normal appearance. In a few specimens, notably females, the pale areas are brighter and more prominent than usual; in other specimens the dark areas at times, especially in the terminal portion of the wing, assume a brighter brown coloration. In a single female the whole coloration is light brown, and even the hind wings are pale brownish instead of deep smoky, probably because of poor development of the pigmentation.

The larva occurs in considerable numbers in June and early July on shrubs of *Myrica gale* growing on the east side of the lake near White Point Beach lodge. It ties up the terminal shoots in a manner similar to that of the larvae of *Archips myricana* and *Tortrix alleniana* which are also found on the same plants. While the general appearance is of the usual *Exartema* type, the color of the abdomen lacks the bright green of *permundanum* and *valdanum* and is variably suffused with pale smoky; when such coloration is extreme the larva presents a dull grayish appearance. The normal flight of the species is in early August, but bred specimens usually appear about two weeks earlier.

HOLOTYPE: Male, White Point Beach, Queens County, Nova Scotia, July 11, 1953, bred from larva on *Myrica gale* (J. McDunnough).

ALLOTYPE: Female, same data, but July 13.

PARATYPES: Fifteen males and 15 females, same data, but with dates ranging from July 9 to July 20.

The holotype and allotype and several paratypes will be deposited in the Canadian National Collection. Other paratypes are in the American Museum of Natural History and the author's collection.

EUCOSMINAE

Anchylopera subaequana Zeller

Figures 1, 4, 7

Phoxopteris subaequana ZELLER, 1875, Verhandl. Zool. Bot. Gesell. Wien, vol. 25, p. 254, pl. 8, fig. 9. FERNALD, 1882, Trans. Amer. Ent. Soc., vol. 10, p. 49.

Anchylopera subaequana, HEINRICH, 1923, Bull. U. S. Natl. Mus., no. 123,

pp. 233, 235, pl. 56, fig. 390 (male genitalia). FORBES, 1924, Cornell Univ. Agr. Exp. Sta. Mem., no. 68, p. 408. MCDUNNOUGH, 1955, Amer. Mus. Novitates, no. 1725, pp. 2–4.

In my recent remarks on the synonymy of *Anchylopera* species (1955) little was said regarding the present species except to verify Heinrich's determination, to note the type of male and female genitalia, and to suggest that several species might be represented in what was called the "*subaequana* complex." At that time the Nova Scotian material represented in the museum here consisted of a series collected by the author in 1953 at White Point Beach, Queens County, on the "barrens" close to the point and another series, slightly different in appearance, taken around *Myrica gale* along the shore of the lake, behind the sea wall. After a comparison of specimens from the above material with Zeller's type male in the British Museum by J. D. Bradley and a study of a photograph of the same by myself, it was definitely confirmed that the series from the barrens represented the true *subaequana* and that Zeller's original figure of the maculation of the primaries was very accurate. Unfortunately the type is without abdomen but a slide (B. M. No. 3271) of the genitalia of another male in the Zeller collection, probably a paratype, matched well genitalic slides from this same material sent for comparison, and, as far as could be told, with Heinrich's figure.

The form occurring on the barrens was on the wing in 1953 during the last week in June, and good series were taken on June 25 and 26. A few others were collected on June 28 and 29, after which date only occasional specimens were seen. In 1954 arrival at White Point Beach was on July 15, and in consequence no *Anchylopera* was seen. In 1955 the arrival was timed to coincide with the time of flight on the barrens, but in spite of continuous searching not a single specimen could be found. The shrubs on the barrens, especially the bayberry, appeared to have been partially killed, either by a severe winter or possibly by salt spray during one of the hurricanes; the hibernating larvae of the *Anchylopera* suffered apparently from the same cause.

A study of the series of typical *subaequana* taken on the barrens shows that a certain amount of individual variation in maculation of the primaries exists, which is partly sexual. The following most characteristic features are herewith noted. The deep brown basal patch is sharply defined in both sexes and shows a distinct, more or less rounded projection into the cell at or near the end of its costal margin; its outer edge is gently rounded, being practically perpendicular to the inner margin of wing below the fold. The oblique median bar is distinctly deep brown at its inception on costa, then largely suffused with pale olivaceous and

continued to near tornus by a mixed brownish and olivaceous perpendicular area, suffused on its inner side but defined by a white line on its outer edge; this area is crossed by several short, black streaks, generally two in the male with a spot above tornus, but more numerous and better defined in the female. Between the median bar and the apex of the wing are three equally spaced, triangular, brown spots, separated from one another by a whitish area through which a thin brown hairline runs; the size of these spots appears to be fairly constant in the male sex, but in the females they are occasionally reduced in size to mere streaks, so that, together with the already mentioned hairlines, they appear as seven short, dark dashes between the median bar and the apex of the wing. The terminal area is more or less pale olivaceous, with a faint silvery tinge. The apex of wing shows a large brown spot. The fringes are largely whitish, cut by a thin, brown line below apex and tinged with smoky outwardly. The female is generally smaller than the male, with much darker secondaries.

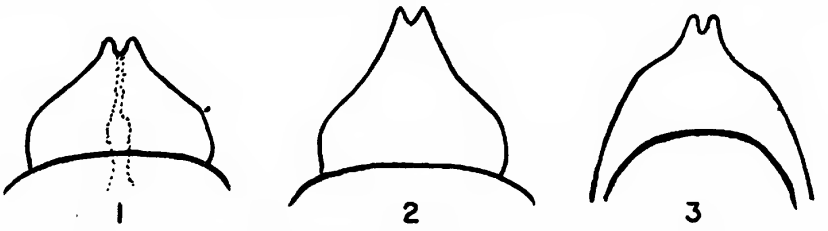
As regards the genitalia, Heinrich's figure of the male organ (*ibid.*, fig. 390) is quite accurate, apart from a certain misplacement of the aedeagus which is almost impossible to avoid when mounting in balsam, owing to its strongly dorsally recurved, basal portion. A study of seven slides made from the White Point Beach material shows that the uncus is represented by two minute knobs projecting from its broad base. The cucullus shows a certain amount of individual variation, and its shape cannot be used as a good specific character. The bluntly pointed projection on the lower edge of the sacculus and the following semicircular excavation seem fairly constant. The aedeagus is well chitinized, more heavily towards its apex which terminates in a small hook. The vesica shows a long series of very fine cornuti.

The female genitalia, of which 10 slides were made, are of the usual type. A raised, transverse, semilunate, chitinous flap partially covers the semicircular ostium which leads into a long, chitinized ductus bursae which bulges ventrad initially and then continues either straight or with a slight inclination to the left, narrowing somewhat distally. A very short membranous section bends dorsad of the chitinized section and enters the bursa at its upper end. The bursa is large, oval, with frequently a small distal appendage, and is furnished in its upper section with the usual two sagittate signa, the signum of the right side being fully twice the length on the one on the left side.

As regards the larva and its food plant, nothing definite has been discovered. There is a slight possibility that the food plant is bayberry (*Myrica pennsylvanica*), a shrub very plentiful on the barrens. The fact that the bayberry was partially destroyed during the winter of 1954 and

that no adults of *subaequana* could be found in 1955 points in this direction. Some confirmation of this suggestion is also found in the fact that the very closely allied form already mentioned was always captured in association with sweet gale (*Myrica gale*), a plant in the same genus as bayberry. The larva, like that of many of the other species of the genus *Anchylopera,* probably appears late in the fall and hibernates full grown, pupating in the following spring.

In regard to the form mentioned above as being always associated with *Myrica gale,* it was first noticed in 1953 on June 26 when two males were captured. On June 30 five males and a female were taken, but the main flight occurred on July 1 when a series of 11 males and six females were secured around a single large clump of *Myrica.* After this date only occasional specimens appeared until July 9 when the final series of four males and one female was captured. In 1955 the form was quite prevalent in the same locality, and between June 25, when a single male was taken, and July 6, when a series of 10 males and five females was netted, a total



FIGS. 1–3. Uncus of *Anchylopera*, dorsal view. 1. *A. subaequana* Zeller. 2. *A. galeamatana*, new species. 3. *A. sheppardana*, new species.

series of 27 males and 12 females comprised the capture. Two single females were taken on July 10 and 14, respectively. After a careful study of the above material and numerous genitalic slides, sufficient differences from *subaequana* have been noted to warrant, in the author's opinion, a specific name. The species can be probably considered as a sibling one.

The following description is largely a comparative one stressing the points of difference between this species and *subaequana.* It should also be noted that not every individual shows all these differential features of either maculation or structure; quite frequently one or the other may be missing.

Anchylopera galeamatana, new species

Figures 2, 5, 8

MALE: Very similar in general appearance to that of *subaequana.* The dark brown basal patch of the primaries shows the same type of bulge into the cell towards the distal end of the costal edge. The outer edge,

however, is in general more oblique and less rounded, reaching the inner margin of wing closer to tornus than is usual in *subaequana.* The oblique median costal streak is not brown at its inception but is a pale olivaceous and much fainter than in *subaequana.* The upright portion of this band is also a pale olivaceous, at times connected with the costal streak and in other cases very obscure, in general much more so than in *subaequana;* it contains two short, black, transverse streaks which are frequently obsolescent. The whole terminal section of the wing shows a faint suffusion of olivaceous. The three brown triangular spots in the terminal half of the costa, so characteristic in general of *subaequana,* are reduced to thin streaks, paler in color, and scarcely distinguishable from the intermediate four streaks. Even when somewhat larger they are not so large nor so dark as in *subaequana.* The fringes are white, very slightly tinged with smoky outwardly and cut by a fine black dash below apex of wing. The secondaries are light smoky. Expanse 15 mm.

FEMALE: Considerably smaller than the male, with an average wing expense of 13 mm. The maculation of primaries is very similar to that of the male but in the terminal half of the wing generally somewhat better defined.

MALE GENITALIA: Scarcely to be differentiated from those of *subaequana.* From a study of a number of genitalic slides it has been evident that a certain amount of individual variation occurs. There is a definite tendency for the apical section of the uncus to be more drawn out and narrower than the normal form in *subaequana.* An extreme form of such elongation is shown in figure 2, drawn from a paratype; this however, is by no means constant and in other specimens scarcely any difference can be noted between the two species. In the clasper the width and breadth of the cucullus are subject to some variation. The ventroterminal projection of the sacculus is generally longer, more pointed, and somewhat upturned so that, in consequence, the shape of the following invagination is slightly different, as a perusal of the figure 5 will show. These differences are, however, very slight and not always obvious, because of the difficulty in securing two slides in exactly the same position. No difference could be noted in the aedeagus.

FEMALE GENITALIA: Raised flap over the ostium more extended laterally and not so high. Chitinized portion of ductus bursae similar in length but with a stronger bulge ventrad in its initial portion so that, while actually straight, the pressure of the cover glass forces the distal half far more to the left than occurs in *subaequana;* this may be noted by a comparison of the two figures given (figs. 7, 8). The two sagittate signa in the bursa show the best differential characters; the longer one on the right

side is considerably shorter than that of *subaequana,* being less than twice as long as the shorter and rather chunky signum on the left side.

HOLOTYPE: Male, White Point Beach, Queens County, Nova Scotia, July 1, 1953, (J. McDunnough).

ALLOTYPE: Female, same data.

PARATYPES: Five males, same data as holotype; two males, same data, but June 30, 1953; eight males, same data, but June 27, 29, and July 4, 6, 1955. Three females, same data as allotype; two females, same data, but July 6 and 9, 1953; five females, same data, but June 28, July 3, 4, 10, 1953.

The holotype and allotype will be deposited in the Canadian National Collection; paratypes in the same collection, in the American Museum of Natural History, and in the author's collection. A long series of specimens in less perfect condition than the type series are placed in the Nova Scotia Museum collection.

A third member of the *subaequana* complex has been represented for some time in the collection by a few odd males, awaiting a longer series and especially specimens of the female sex before their status could be decided on. Two of these males had been collected in the Montreal region by A. G. Sheppard on June 13, 1947, and, after a request for possible further material, this collector, with his usual generosity, was able to send a series of eight males and one female taken on the same date as the above two males, with other specimens of various dates, including six females. Mr. Sheppard stated further that in the locality where the collections were made, now unfortunately completely built over, there was no growth of *Myrica* but "considerable areas of a dwarf willow and in the drier parts some *Spiraea* and another woody-stemmed shrub of which I never obtained a name." After a careful study of this series, sufficient differences have been noted to warrant, in the present author's opinion, description as a new species, although there is of course the possibility that, when definite details regarding the food plant of the larvae are available, the name given below in the honor of the collector may be reduced to the status of a subspecies.

Anchylopera sheppardana, new species

Figures 3, 6, 9

Characterized in the first place by its smaller size as compared with *subaequana* and *galeamatana,* the average width of the wings of spread specimens, measured from apex to apex, being approximately 12 mm. The maculation of the primaries is essentially of the same type as that of the

other two species but in general more obscure, especially in the terminal half of the wing which is usually almost completely suffused with gray-brown shading; the white costal area in the basal half of the wing also shows some light suffusion. The outer edge of the dark basal patch is even more oblique outwardly than in *galeamatana* (some slight variation in this respect has been noted). The oblique, brown, mediocostal band is variably distinct but generally much obscured by shading in all portions; the two black transverse dashes in the upper portion and the dark dot above the tornus are present. The costal brown streaks in the apical half are thin and much as in *galeamatana.* The fringes, except for the apical brown spot and a minute dark streak below it, are dull white. The female maculation, as far as can be told (most of the specimens are somewhat worn), is much as in the male, the brown areas, notably the basal patch, being possibly a shade deeper in color.

MALE GENITALIA: Apart from the somewhat smaller size of the entire organ, there is little difference from either of the other two species. The ventro-apical pointed projection of the sacculus is much as in *galeamatana.* The cucullus shows a certain amount of variation (five slides examined) in both length and width. The length of the aedeagus appears somewhat shorter, apparently owing to the fact that the cephalad recurving of the basal portion is less pronounced than in the other two species. In consequence of this it was noted that the claspers opened out much more readily than was the case with either of the other species. The basal two-thirds of the uncus is broad, narrowing more rapidly towards the apex than in *subaequana,* the two terminal knobs being also slightly better developed than in this species.

FEMALE GENITALIA: The transverse raised chitinous flap partially covering the ostium is quite similar to that of *galeamatana,* but on the whole its width is somewhat greater. The initial chitinized portion of the ductus bursae shows a stronger bend dorsad in its proximal half than occurs in *galeamatana,* causing it to curve sharply to the left on a slide under pressure of the cover glass. The terminal, membranous portion is longer than in either of the two related species and shows less of a dorsal recurve around the end of the chitinized portion. The signa of the bursa resemble closely those of *subaequana,* the signum on the right side being more than twice the length of that of the left.

HOLOTYPE: Male, Montreal, Quebec, June 13, 1947 (A. C. Sheppard), in the Canadian National Collection.

ALLOTYPE: Female, same data, in same collection.

PARATYPES: Eight males, same data as holotype; one male, same data, but June 2, 1934; one male, Morin Heights, Quebec, May 30, 1953 (A. C.

Sheppard); one female, Montreal, Quebec, June 9, 1928; one female, same data, but June 16, 1929; one female, same data, but June 4, 1932; three females, same data, but June 2, 1934. Deposited in the collections of the American Museum of Natural History, of A. C. Sheppard, and of the author.

REMARKS: Two male specimens, taken at light at Brierly Beach, Antigonish County, Nova Scotia, on June 28, 1954, by D. Ferguson, appear to belong to this species but have not been made paratypes.

GRACILLARIIDAE

Gracillaria canadensisella, new species

In 1954 and 1955 a number of specimens of a *Gracillaria* species were reared in the early spring from larvae found the previous fall in large tents formed by the bending over of a lateral section of the leaf of *Cornus canadensis.* The larvae, pale creamy in color, hibernated in their tents. When brought into a warm room they emerged from these and pupated, without further feeding, in pale yellow cocoons spun along the edges of the container. The adults appeared in approximately two weeks.

According to Forbes (1924, Cornell Univ. Agr. Exp. Sta. Mem., no. 68, p. 171) three species of *Gracillaria* are known to feed on *Cornus,* but the present species does not run to any of these in Forbes's key (*ibid.,* p. 169). From *belfrageella* Chambers it is at once separated by the lack of a golden streak at the base of the inner margin. From *burgessiella* Zeller it differs in the shape of the first golden spot, which according to Forbes (p. 173), is "comma shaped or semicircular, with the straight or concave side outward." This agrees with Zeller's original figure (1873, Verhandl. Zool. Bot. Gesell. Wien, pl. 4, fig. 39) but does not at all apply to the shape of this spot in the present species. The maculation appears to run closest to that of *cornusella* Ely (1915, Insec. Incit. Menstruus, vol. 3, p. 53) but differs in the larger size of the second, golden, costal spot and the presence of a minute golden spot opposite it on the inner margin, lacking in *cornusella.* The life history is also different, the larva of *cornusella* appearing on *C. stolonifera* in mid-July in a rolled-down leaf and producing an imago in late July and early August, which apparently hibernates as do many species of the group.

Under the circumstances a description as a new species with the above name seems warranted. The detailed description follows.

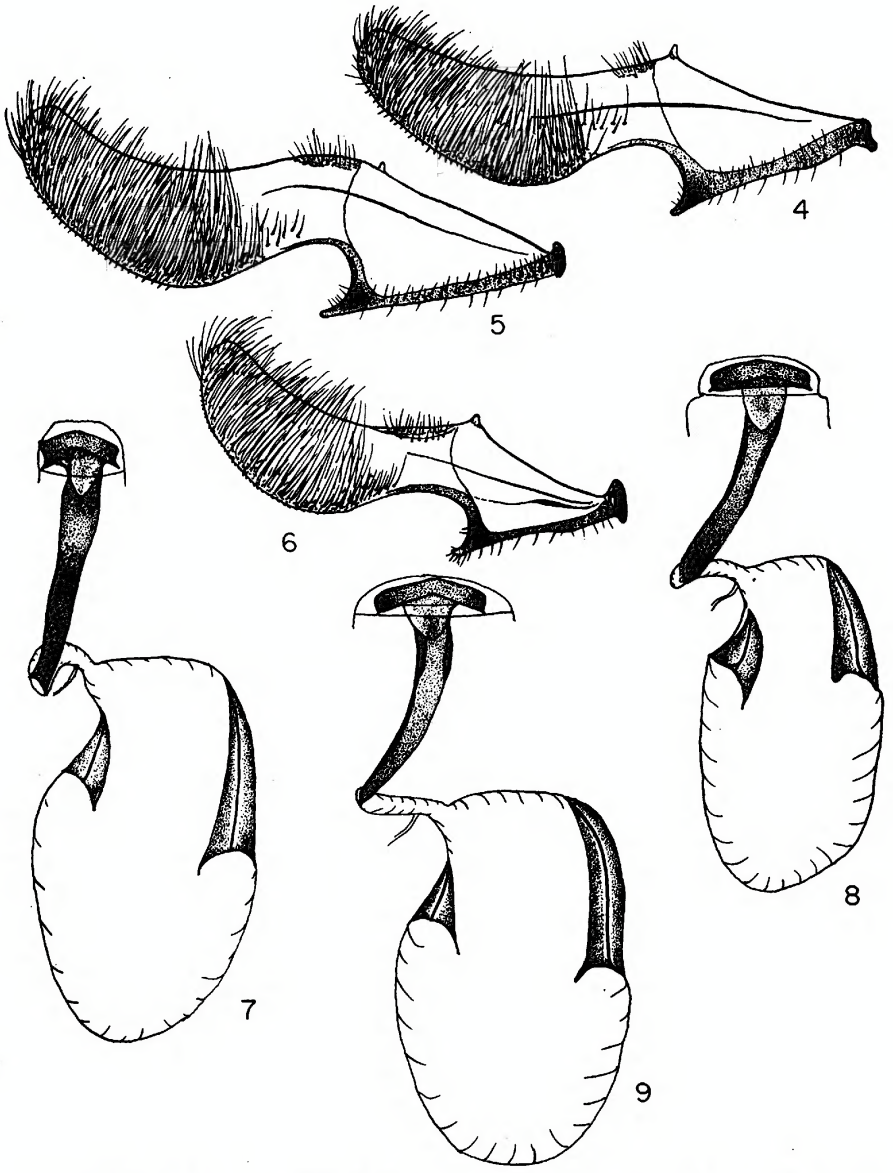
MALE: Labial palpi whitish, with a narrow preapical black band. Front whitish yellow, shining. Head and thorax dark purplish, iridescent. Abdomen dorsally purple, ventrally largely pale yellow. Primaries deep

purplish, iridescent, with two large, golden, costal spots; the interior one, two-fifths from base, forms a broad band, directed obliquely outward with the sides practically parallel, and extending across the fold almost to the inner margin of wing, frequently somewhat narrowed at its terminal edge. The outer, subapical spot is separated from the inner one by a broad area of the ground color; it is rather variable in shape but in general more or less rectangular and extends nearly halfway across the wing; opposite to its outer edge is a small (at times very minute) golden, tornal spot. Fringes deep smoky, crossed by a faint, darker, subbasal line followed by a finer, paler line outwardly. Secondaries and fringes deep smoky. Expanse, 10 mm.

HOLOTYPE: Male, Point Pleasant Park, Halifax, Nova Scotia, April 15, 1954; bred from *Cornus canadensis* (J. McDunnough). Deposited in the American Museum of Natural History.

ALLOTYPE: Female, same data, but April 14, in author's collection.

PARATYPES: Nine males, same data, but April 14, 16, 17, 19, 20, 1954. Four males, same data, but March 11, 14, 15, 17, 1955. One female, same data, but April 17, 1954. Specimens will be placed in the Canadian National Collection and the American Museum; the balance, in author's collection.



FIGS. 4–6. Left clasper of *Anchylopera*. 4. *A. subaequana* Zeller. 5. *A. galeamatana*, new species, paratype. 6. *A. sheppardana*, new species, paratype.

FIGS. 7–9. Female genitalia of *Anchylopera*. 7. *A. subaequana* Zeller. 8. *A. galeamatana*, new species, paratype. 9. *A. sheppardana*, new species, paratype.